

In the Claims

1. (currently amended) A gradient copolymer comprising at least two monomers,
 - a) the first (M_1), the homopolymer of which corresponding to a Tg_1 of less than 20°C , representing at least 50% by weight of the total weight of the copolymer,
 - b) the second (M_2), the homopolymer of which corresponding to a Tg_2 of greater than 20°C and preferably of greater than 50°C , representing at most 50% by weight of the total weight of the copolymer,at least one of the monomers ~~having to be~~ being hydrophilic and ~~represent~~ representing at least 5% by weight of the total weight of the copolymer,
said copolymer comprising characterized in that it comprises at least one monomer M_i such that the probability of encountering M_i in any standardized position x situated on the polymer chain is nonzero.
2. (currently amended) The copolymer as claimed in claim 1, ~~characterized in that~~ wherein Tg_1 is between -150 and 20°C . and preferably between -120 and 15°C .
3. (currently amended) The copolymer as claimed in ~~claim 1 or 2~~ claim 1, ~~characterized in that it exhibits~~ having an average masses of between 5000 g/mol and $1\ 000\ 000$ g/mol and ~~exhibits~~ exhibiting a polydispersity ~~indices~~ index of between 1.1 and 2.5 , preferably between 1.1 and 2 .
4. (currently amended) The copolymer as claimed ~~in one of the preceding claims in~~ claim 1, ~~characterized in that~~ wherein the hydrophilic monomer represents at least 10% by weight of the total weight of the copolymer.
5. (currently amended) The copolymer as claimed ~~in one of the preceding claims in~~ claim 1, ~~characterized in that~~ wherein the hydrophilic monomer is ~~chosen~~ selected from the group consisting of:
 - ethylenic carboxylic acids, ~~such as~~ acrylic acid, methacrylic acid, itaconic acid or fumaric acid;
 - acrylates and methacrylates of polyethylene glycol or of glycol which are or

are not substituted on their end functional group by alkyl, phosphate, phosphonate or sulfonate groups;

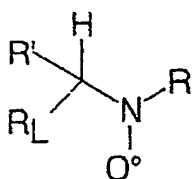
- amides of unsaturated carboxylic acids, ~~such as~~ acrylamide, or methacrylamide and their N-substituted derivatives;
- aminoalkyl acrylates, ~~and~~ methacrylates, ~~and~~ aminoalkylmethacrylamides;
- carboxylic anhydrides carrying a vinyl bond, ~~such as~~ maleic anhydride, or fumaric anhydride;
- vinylamides, ~~such as~~ vinylpyrrolidone, or vinylacetamide;
- vinylamines, such as vinylmorpholine, or vinylamine; and
- vinylpyridine.

6. (currently amended) The copolymer as claimed in ~~one of claims 1 to 5~~ claim 1, characterized in that wherein the monomer M₁ is ~~chosen from the following~~ selected from the group of monomers consisting of:

- linear or branched C₁-C₁₂ alkyl acrylates,
- polyethylene glycol acrylate or polyethylene glycol (meth)acrylate,
- dienes, ~~such as~~ butadiene or and isoprene.

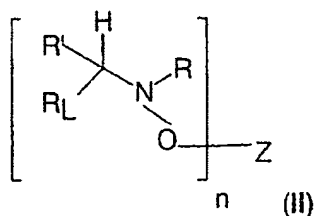
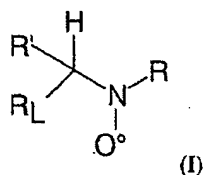
7. (currently amended) A process for producing a gradient copolymer comprising polymerizing by the solution or bulk controlled radical polymerization, at a temperature of between 10 and 160°C ~~and preferably between 25 and 130°C~~, in the presence of a radical polymerization initiator and of an agent for controlling the polymerization, of a mixture of monomers comprising at least two monomers, the first (M₁), the homopolymer of which corresponding to a Tg₁ of less than 20°C, ~~preferably of between -150 and 20°C and more preferably still of between -120 and 15°C~~, representing at least 50% by weight of the total weight of the mixture, the second (M₂), the homopolymer of which corresponding to a Tg₂ of greater than 20°C ~~and preferably of greater than 50°C~~, representing at most 50% by weight of the total weight of the mixture, at least one of the monomers having to be hydrophilic and represent at least 5% by weight of the total weight of the mixture.

8. (currently amended) The process as claimed in claim 7, ~~characterized in that~~ wherein the agent for controlling the polymerization is a nitroxide of general formula:



- where R' and R, which are identical or different and which are optionally connected so as to form a ring, are alkyl groups having between 1 and 40 carbon atoms which are optionally substituted by hydroxyl, alkoxy or amino groups; preferably, R and R' are tert-butyl groups;
- and where RL is a monovalent group with a molar mass of greater than 16 g/mol which can be a phosphorus group or an aromatic group.

9. (currently amended) The process as claimed in claim 7, ~~characterized in that~~ wherein the polymerization initiator and the control agent are advantageously replaced by a mixture composed of alkoxyamine corresponding to the following general formula (II) and of nitroxide corresponding to the general formula (I):



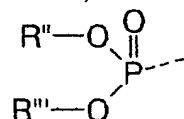
in which:

- n is an integer of less than or equal to 8 and preferably of between 1 and 3,
- Z is a carrying monovalent or polyvalent radical of styryl, acryloyl or methacryloyl type,
- where R' and R, which are identical or different and which are optionally

connected so as to form a ring, are alkyl groups having between 1 and 40 carbon atoms which are optionally substituted by hydroxyl, alkoxy or amino groups; preferably, R and R' are tert-butyl groups;

- and where R_L is a monovalent group with a molar mass of greater than 16 g/mol which can be a phosphorus group or an aromatic group, the nitroxide (I) representing from 0 to 20% by weight of the total weight of the mixture.

10. (currently amended) The process as claimed in claim 8 or 9, ~~characterized in that wherein, in particular, R_L is a phosphorus group and more particularly a phosphonate group of formula:~~



- where R'' and R''', which are identical or different and which are optionally connected so as to form a ring, are alkyl groups having between 1 and 40 carbon atoms which are optionally substituted by hydroxyl, alkoxy or amino groups; in particular, R'' and R''' are ethyl groups; the nitroxide (I) representing from 0 to 20% by weight of the total weight of the mixture.

11. (currently amended) A process for the aqueous dissolution, of the gradient copolymer of claim 1 comprising: ~~according to the following stages, of the gradient copolymers of claims 1 to 6 or capable of being obtained according to the process of claims 7 to 10:~~

- 1) dissolving the copolymer ~~is dissolved~~ in a ketone solution, ~~such as acetone or methyl ethyl ketone (MEK),~~ at a level of solid of between 20 and 90%, ~~preferably between 20 and 50%,~~
- 2) neutralizing the solution obtained in 1 ~~is neutralized~~, if necessary, by addition of a molar solution either of acid or of base, the acid or base choice being conditioned by the chemical nature of the hydrophilic monomer,

3) ~~adding water is then added~~, with vigorous stirring, to the solution obtained in 1 or optionally in 2 in a proportion such that the level of solid obtained is between 1 and 80%; optionally, the water can be replaced by water/alcohol mixtures in proportions ranging from 99/1 to 50/50;

4) evaporating the ketone is ~~evaporated~~ until the desired level of solid is obtained.

12. (canceled)

13. (currently amended) ~~The use of the gradient copolymer of claims 1 to 6 or capable of being obtained according to the process of claims 7 to 10 in formulations for claim 1 comprising a paint, adhesive, glue or cosmetic formulation. paints, adhesives or glues and in cosmetic formulations.~~

14. (canceled)

15. (canceled)

16. (canceled)

17. (new) The copolymer of claim 1 wherein the second monomer (M_2), the homopolymer of which corresponding to a T_{g2} of greater than 50°C

18. (new) The copolymer as claimed in claim 2, wherein T_{g1} is between -120 and 15°C.

19. (new) The copolymer as claimed in claim 3, exhibiting a polydispersity index of between 1.1 and 2.

20. (new) The process of claim 7 wherein said controlled radical polymerization, occurs at a temperature of between 25 and 130°C.